

The National Geographic Magazine

AN ILLUSTRATED MONTHLY



Editor JOHN WYDE

Associate Editors

A. W. GALEY W. J. MAGIE HENRY CANNETT
C. HART MERRIAM JULIA RICHARDSON BROWNE

CONTENTS

	PAGE
THE WINNIPEG BOUNDARY COMMISSION AND ITS WORK.	MARCUS BAKER 100
MINERAL PRODUCTION IN THE UNITED STATES	101
THE FOREST AND PLAINS OF ARIZONA.	J. E. BREKOW 122
MOUNT ST. HELENS.	CHAR. P. CLIFFORD 135
GEOGRAPHIC LITERATURE	136

WATERTOWER

Edited by the NATIONAL GEOGRAPHIC SOCIETY

Address all correspondence to the Secretary,

*The Society of Natural History, Central Park South, New York.
Post Office Box 166, New York.*

Price 25 Cents

\$2.50 a Year

Entered at the Post Office as Second Class Mail.

THE
National Geographic Society
ORGANIZED, JANUARY, 1888

President
GARDNER G. HUBBARD

Vice-Presidents

MARCUS BAKER
WILLIAM H. DAVIS
C. R. GOODRICH

A. W. GRISWOLD
C. MARSH MERRIAM
THOMAS C. MADDEN

Treasurer

CHARLES J. REILLY

HAROLD BARRETT
EVERETT HAYNES

Comptroller, Secretary
HENRY GANSHER

Managers

H. F. BLOUNT
F. V. COVILLO
C. W. DARNEY, JR.
DAVID T. DAY

JOHN HYDE
W. J. MCLELLAN
F. H. NEWELL
W. G. POWELL

SECRETARY'S OFFICE, 1517 K STREET N. W., WASHINGTON

The National Geographic Society, the object of which is the increase and diffusion of geographical knowledge, has a paying membership of 1,100. Its membership is not restricted to practical geographers, but is open to any person in good standing who may be sufficiently interested in its work to seek admission. The annual subscription is: for active members, \$2.00 per annum; for corresponding members, \$1.00 per annum. Active members pay also an entrance fee of \$1.00 on election. The National Geographic Meeting is sent regularly to all members, individual and corresponding.

Donations for the funding of Prize Medals and Scholarships are respectfully solicited.

TYPE OF THE RIBBED TURTLE SHELL OF THE HUANG SHAN GROUP



THE
National Geographic Magazine

VOL. VIII

JULY-AUGUST, 1897

No. 7-8

THE VENEZUELAN BOUNDARY COMMISSION AND ITS
WORK

By MARYS RAKER

Cartographer, U. S. Geological Survey

On the northeast shoulder of South America, between the mouths of the great rivers Amazon and Orinoco, lies Guiana. On the extreme east and nearest the Amazon is French Guiana, or Cayenne; just west of this is Dutch Guiana, or Surinam, while the next division to the west is British Guiana, a colony of Great Britain; and this in turn is bordered on the west by Venezuela, one of the South American republics.

Between these last two, British Guiana and Venezuela, current maps show a boundary line which, starting at or near the southern mouth of the Orinoco (for there are many mouths in its 150-mile-wide delta), runs in a southerly direction into the interior. This line, speaking in only the most general terms, is the now famous Schomburgk line. This boundary is in dispute, and has been so for more than half a century. It has been a source of profit and interminable diplomatic correspondence and negotiation, a correspondence couched in politest phrase, without concealing the earnestness, nay, bitterness, underneath. Proposals and counter-proposals had been made, but without success. Arbitration had been proposed, but until recently Great Britain had steadily refused to submit the entire disputed territory to arbitration. So the case dragged on for weary years. Finally, in 1886, some 10 years ago, Venezuela severed diplomatic relations with Great Britain and sent her official representative away.

Venezuela then sought to bring about indirectly, through the friendly aid of a third power, a settlement of the long standing

and irritating controversy. The matter was taken up by our own foreign office (the Department of State) and correspondence carried on in 1895 between Secretary Olney and Lord Salisbury. Secretary Olney, in a document resembling a lawyer's brief much more than it does the ordinary diplomatic dispatch, stated the case as it appeared to him and asked that it be arbitrated. To this Lord Salisbury replied in two careful and most courteous despatches (as diplomatists are wont to call letters), declining general arbitration.

Thereupon President Cleveland, on December 17, 1895, sent to Congress this correspondence, accompanied by a brief but now famous message—a message of which, without exaggeration, it may be said that it startled the civilized world. After summarizing the correspondence and commenting upon Lord Salisbury's two replies, President Cleveland proceeded as follows:

In the belief that the doctrine for which we contend (the Monroe doctrine) was clear and definite, that it was founded upon substantial considerations and involved our safety and welfare, that it was fully applicable to our present conditions and to the state of the world's progress, and that it was directly related to the pending controversy, and without any reference as to the final merits of the dispute, but anxious to learn in a satisfactory and expeditious manner whether Great Britain ought, under a claim of boundary, to extend her possession of territory fairly included within her lines of ownership, this government proposed to the government of Great Britain a resort to arbitration as the proper means of settling the question, to the end that a vexatious boundary dispute between the two contestants might be determined and our exact standing and relation in respect to the controversy might be made clear.

It will be seen from the correspondence herewith submitted that this proposition has been declined by the British government upon grounds which, in the circumstances, seem to me to be far from satisfactory. It is deeply disappointing that such an appeal, actuated by the most friendly feelings toward both nations directly concerned, addressed to the sense of justice and to the magnanimity of one of the great powers of the world and touching its relations to one comparatively weak and small, should have produced no better results.

The course to be pursued by this government, in view of the present condition, does not appear to admit of serious doubt. Having labored faithfully for many years to induce Great Britain to submit this dispute to impartial arbitration, and having been now finally apprised of her refusal to do so, nothing remains but to accept the situation, to recognize its plain requirements and deal with it accordingly. Great Britain's present proposition has never thus far been regarded as admissible by Venezuela, though any adjustment of the boundary which that country may deem for her advantage and may enter into of her own free will cannot of course be objected to by the United States.

Assuming, however, that the attitude of Venezuela will remain unchanged, the dispute has reached such a stage as to make it now incumbent upon the United States to take measures to determine with sufficient certainty for its justification what is the true divisional line between the Republic of Venezuela and British Guiana. The inquiry to that end should of course be conducted carefully and judicially, and due weight should be given to all available evidence, records, and facts in support of the claims of both parties.

In order that such an examination should be prosecuted in a thorough and satisfactory manner, I suggest that the Congress make an adequate appropriation for the expenses of a commission, to be appointed by the Executive, who shall make the necessary investigation and report upon the matter with the least possible delay. When such report is made and accepted it will, in my opinion, be the duty of the United States to resist by every means in its power a willful aggression upon its rights and interests the appropriation by Great Britain of any lands or the exercise of governmental jurisdiction over any territory which, after investigation, we have determined of right belongs to Venezuela.

In making these recommendations I am fully alive to the responsibility incurred and keenly realize all the consequences that may follow.

I am nevertheless firm in my conviction that while it is a grievous thing to disinterporate the two great English-speaking peoples of the world as being otherwise than friendly competitors in the onward march of civilization and strenuous and worthy rivals in all the arts of peace, there is no calamity which a great nation can invite which equals that which follows a supine submission to wrong and injustice and the consequent loss of national self-respect and honor, beneath which any slighted and despised people's safety and greatness.

This short message went to Congress December 17, 1895, where it was read and referred to the Committee on Foreign Affairs. The following day, December 18, the chairman of that committee, the Hon. R. R. Hitt, reported a bill (H. R. 2173) appropriating \$100,000 for the expenses of a commission to investigate and report upon the true divisional line between British Guiana and the Republic of Venezuela. This bill was passed by the House of Representatives forthwith and unanimously; it was then sent to the Senate. It was on the following day, the 19th of December, referred to the Committee on Foreign Relations in the Senate. The next day it was reported back, debated, and passed without amendment. The following day, December 21, it was a law, having received the signatures of the Speaker of the House, the Vice-President, and the President. Thus President Cleveland's suggestion on December 17, that a commission be created, was four days later the law of the land, and made so with an unanimity almost, if not quite, unparalleled. No vote

against it was recorded in either branch of Congress. On January 1, 1897, the commission was appointed, and consisted of five persons, viz:

Hon. David J. Brewer, one of the justices of the Supreme Court of the United States; Hon. Richard H. Alvey, Chief Justice of the Court of Appeals of the District of Columbia; Mr. Frederick P. Coudert, a distinguished member of the New York bar, who had acted as counsel for the United States in the Herring Sea arbitration case; Hon. Andrew D. White, historian and diplomatist, and Dr. Daniel C. Gilman, a learned geographer, president of the Johns Hopkins University. This commission organized by electing Mr. Justice Brewer president and Mr. Sevèro Mallet-Pretost, of the New York bar, as secretary.

Upon this commission were laid two duties: first, to investigate, and second, to report. Obviously investigation was first, not merely in order, but in the amount of labor involved and in importance. In the early sessions of the commission the whole subject was canvassed, and the work of investigation planned, organized, and assigned. Professor George L. Burr, of Cornell University, a painstaking and accurate historian and linguist, was sent to Holland to investigate the Dutch archives. Later on he was joined there by Mr. Coudert, of the commission. For assistance in the preparation of maps and in geographical investigation, application was made to the U. S. Geological Survey. To this work I was assigned, and from January to May, 1896, gave to it such time as could be spared from Survey duties. In May, 1896, I was, however, detailed to the service of the commission, and continued to serve on this detail till the close of the commission's labors and the publication of its results in June, 1897.

When, in November, 1896, it was made known that Great Britain and Venezuela had at last come together and had agreed to submit their dispute to arbitration, the commission found itself set free from the need of pronouncing judgment. As the contending parties had themselves agreed to submit their differences to an arbitral tribunal, it was obviously for that tribunal to pronounce judgment. Moreover, as Mr. Justice Brewer had been chosen as a member of the arbitral tribunal, it was obviously improper that he should pronounce judgment in advance of his sitting with that tribunal. The commission accordingly decided to withhold any conclusions it might have reached and to publish only its investigations. Thus the facts gathered have become public property. The investigations undertaken were unfinished

when arbitration was agreed upon, but the commission decided to stop short and print in as complete and systematic form as time permitted the facts then gathered.

The facts gathered by the commission are set forth in three octavo volumes and an atlas comprising 76 maps. The atlas constitutes volume 4 of the report and was the first volume completed. It is composed, as above stated, of 76 maps, divided into three groups or parts.

Part I comprises 15 maps, all printed on the same base. This base map was specially compiled and engraved for the commission, and is designed to represent the latest and best information as to the natural features of the Orinoco-Essequibo region. It is based chiefly on the so-called great map of the colony, dated 1873, and published by E. Stanford, of London, in 1877. Various other maps were also made use of in its compilation. The disputed territory along the seacoast is so differently shown on maps of high authority that a compromise seemed impossible, and accordingly two different maps of the same tract are shown side by side on the base map. Map 1 shows various boundary lines proposed or claimed, map 2 the forests and savannas, map 3 the principal drainage basins, and map 4 the geology of the region as far as known. Maps 5 to 14 are historical maps, showing European occupation at various dates from the earliest down to 1814. "These eleven historical maps," says Professor Burr, "have been prepared to illustrate my report on the evidence of Dutch official documents as to occupation and claims in the region between the Essequibo and the Orinoco, and are an attempt to show graphically the conclusions reached by that report." It may be noted in passing that if title to the disputed tract is to be determined by occupation, these maps showing occupation are of great significance and importance.

Part II of the atlas comprises 41 maps, facsimile reproductions of the "mother maps" of the region—produced during a period of about 300 years. Volume 3 of the commission's report contains a paper by the secretary, Mr. Sevoro Mallet-Prevost, on the Cartographical Testimony of Geographers. The 41 maps mentioned illustrate that report and exhibit the gradual evolution of our geographical knowledge of the disputed area, and also the evolution of the various boundary lines. It constitutes an interesting and instructive group of maps and makes available for students a number of source ones.

Part III comprises 20 maps of an official or semi-official character, of which 12 are from manuscript originals not hitherto published. The origin of these maps, their character and mapping are set forth by Professor Burr in a paper in volume 3.

In describing the atlas, we have in part anticipated the description of volume 3, which is devoted to geography. It is an octavo volume of 517 pages and contains 6 papers. The first is by the secretary of the commission on the cartographical testimony of geographers. In its 50 pages the historical evolution of maps showing territorial division are worked out with great care, and the size of the paper inadequately measures the labor needed to gather and arrange and clearly set forth and discuss the facts therein contained.

The second paper is by Dr. Justin Winsor, Librarian of Harvard College, and it deals with the same topic as the preceding paper, but in a different manner. This paper was submitted to the commission very early, its date being March 4, 1898, just two months after the commission was appointed. The third and fourth papers are by Professor Burr.

The fifth paper, entitled Notes on the Geography of the Orinoco-Essequibo Region, South America, is by the present writer. It consists of a private compilation of statements made by various travelers and explorers in the region as to its geography, with references, in foot-notes, to the sources of these statements. All the geographic names found applied in the region, whether now in use or not, were recorded in these notes, which are fully indexed. Thus it is possible to proceed quickly by means of the index and foot-notes to the original sources of geographic information touching any part of the country described in these notes.

The last paper in the volume is a partial list of maps of the region, also prepared by the writer. It was hoped to make an exhaustive list, but time did not suffice for this, nor for the preparation of a bibliography of the region.

Volume 2 is given mainly to extracts from Dutch archives. There are 253 of these extracts, comprising 802 pages. They are printed in double columns, the original Dutch forming one column and the English translation the parallel column. Some miscellaneous manuscript documents, filed with the commission by the government of Venezuela, close the volume.

Volume 1, first in order but last to be published, is now in press and will shortly be published. It is to contain the report

of the committee, which, however, is not true to the whole truth, both Congress, 1st session, It is to contain also a report by Professor J. F. Johnson of Brown University, on the Treaty of

1843, the British and Venezuelan of 1843, the boundary number

or 1843, and the 1851 or part of the title 2. Professor Buffa, I presume, however, will be a competent writer of Dutch legislation and things in the disputed territory, as gathered from these old documents, a chronicler of the Dutch.

With the publication in the summer of 1857 of these four vol-

kons recommended to a new tribunal—a tribunal of arbitration, to be composed of five of the world's leading states.

The commission, whose work friends and the nation expect, is to be a United States commission. The United States doth not represent in this case itself, and it did this "to determine with sufficient certainty, for its own satisfaction, what is the true boundary line between British Guiana and Venezuela. It is a long and difficult to undertake of the commission to put to a stand our friend Venezuela upon plumb at once, only to dash it to the saddle extremely fatigued, the intermission now and then. Yet we may demand so to do, and neither had appeal to new or other tribunals. But let this be understood, here and there that this quiescent revolutionary arbitration, if I may say so, must well be turned into an actual arbitration, and in that where all the

been released. With the Inter-governmental commission was on the way to a peaceful, amicable, just, and firm determination, an agreement to arbitrate had been reached.

before such a power, subject toward securing the independence now, and a full remit of debts, &c., & the peace and separation. Which is too apparent of the commission itself to be in its report said. "A wise and just view of the case is best law, a consent to submit hereto all in dispute to no greater,

40 THE EXECUTION OF PROPERTY IN MEXICO

In addition to the influence exerted by the usurper in attracting the powerful settlement of the capital, his contribution will have been to the adoption of the work, when it was overlooked. The investigation in history and geography set forth in the papers accompanying its report has a value wholly apart from the mere technicality of the original.

A few words about the arbitral tribunal. I will the work be referred to and take a ready tool of ART. 10.

On February 2, 1857, a treaty of arbitration as to the boundary

articles, according to precise legal and formal terminology can be dispensed to be discussed. A printed copy of that of a public treaty can before me I write. Let us summarize it.

First. An arbitral tribunal is to be appointed forthwith.

Second. It is to be composed of five jurists, two named by

the Government of Mexico, and three by the Government of the United States.

Third. The tribunal is to determine what belonged to the

Government of Mexico, and what to the Government of the

United States, and what is now British Guiana.

THE TREATY, VIZ.

a) Arbitrators named to be present within one year to effect full & prompt de-

b) The arbiters are fully recognized as to give effect to new rights

c) which conform to international law

d) in determining the boundary, if the tribunal should find

disagreement on the effect which in its opinion is to have by reason,

MINE AND PROPERTY IN THE UNITED STATES 291

Fifth. Two arbitrators are to meet in Paris within ten days after the printed arguments have been submitted, and due to the

each party to appoint an agent to assist the trial.

Sixth. Within eight days of the conclusion or before February 14, 1888, the case is to be arbitrated with printed documents, etc.

Seventh. Within four months thereafter, i.e., on or before June 14, 1888, the award made is to be publicly submitted, and may contain some arbitration, with proofs.

Eighth. Within three months thereafter is to be made before the agreement to print the arguments may begin to trial.

Ninth. The arbitrators may lengthen said period above mentioned by a day.

Tenth. The award is to be rendered within three months after the trial by the arbitrators who assent to it.

Eleventh. An exact journal of proceedings is to be kept.

Twelfth. The cost of the arbitration shared equally.

Thirteenth. The award is to be rendered within three months after the trial by the arbitrators who assent to it.

Paris, 20th of August 1887. (Signed) J. S. G.

THE UNITED STATES OF AMERICA

The internal products of the United States in the year 1886

valued at \$1,202,347, or \$18,000,000, less than half of the value of the metals, being twice by \$2,700,000, than it was.

The great increase in the production of pig iron, so much concentrated on last year has not been maintained, the cost of having been still more than double long term representing a decrease in value of more & \$100,000. On the other hand, the production of gold has increased from \$10,000,000 to \$20,000,000,

(from \$2,000,000 to \$4,000,000). Gold shows an increase of over 100 percent in four years. The production of silver is also largest

Salt MINERAL PRODUCTION IN THE UNITED STATES

at the end. The most remarkable feature, however, is that of

however, from \$125 to \$150 (without the portion banded) a return to a comparison of the value in 1891 and 1896, an increase in consumption of about one-third (135,115,000 to 147,000,000), slight loss had been compensated by a

(from \$115,744,771 to \$114,51,545). On the other hand, a very
appreciated material as great a rise in the market as the output
of one year before year. The production of salt in a stone has been
increased, but in point of value (per ton) it being reported
darker than, but the estimation production of rock salt is still
represented by the same small figures (\$115,000), but there
are no data for the last half dozen years.

There appears to have been a marked increase during
the last few years, but it is interesting to know how far back the increase
dates at least for it is to be attributed to the opinion by largely
increased use of brine water as a remedy for certain bodily
ills which seem to be quite early characteristic of our time. On
the 20th January present price per ton, per barrel
has ever attained, salt shows a slight increase in production,
with a considerable increase in value, and the production of
salt—no less than 180,000,000 lbs.—at an interval recent
with the same exception of that of 1894. J. H.

THE FORESTS AND DESERTS OF ARIZONA*

By Louis F. Benson, Ph.D., LL.D., etc.

(Chief of the Survey of Forests, U. S. Department of Agriculture)

It is a probable fact that but few of our people have any idea of the composition of the vegetation and the varied reactions of our country, at least less do they realize the importance of our future growth. The region of the country, even of those who have had hasty overhasty trips, rarely reaches beyond the limits of the personal observation, and as to the present most of the information to be had is old or not determined enough to give us from the literature outside in the professional journals, data to basis reasonable expectation.

Was it only yesterday that, by a ride—also in connection with a government public-spirited friend—would take me for the summer from O'Neil and through Arizona, two experiences were most frequent—loss of communication at my prospects of sun and temperature, the other a sorrow at seeing such beauty, the natural forest so little found left intact in that country of desert and desert. That a large part of the territory of Arizona can boast of all real summer climate, or, as just for example, can be reached by the railroad or one of the roads, covered in almost its entire tract a mile & speaking are to be found there, in the most lovely and most extensive, as well as most beautiful

the Pacific coast and the west of border of the Atlantic forest in Texas and Arkansas, a thousand miles away, east or northwest, than good to them our most important.

Why should this portion of forest area become a subject of discussion? The question is worthy of answer. There is but territory existing for the best forest development on & the most rapid. In this & most recent Spanish forests, I observed not an irrigation for the regeneration of timber and I do not believe that a portion of its water sources which a forest cover is supposed to afford. Well, if it can be shown to satisfy the need of it is impossible to the whole country of the country, no

*A paper read before the American Geographical Society, February 5, 1901.

to study the conditions under which this resource could be taken advantage of, or whether other services, limited, resources? To be sure, this is hardly the way we are wont to do, for with regard to our government, especially our administration from Arkansas; "When it was morning he said unto his

"Come ye of Galilee," the Hesj^t villages, were the first to the hospitalities of the Jews so long ago. It re-

cently years later another of the consultations, Anton de

Oppidum, in 1864, for the purpose of obtaining a mule train to San Felipe \$10,000.00.

Spaniard's mule train was confined entirely to the lower part

of Tucson and Tucson to protect the Indians and the few settlers by harassing their Indian and Spanish neighbors so much as was necessary to the progress of civilization.

In 1863 the territory of Arizona was separated from New Mexico.

From 1864 to 1867 there was extensive to the lower portion of what is now our southwestern frontier by the Apaches.

from 1862 to 1869 given in the first detailed knowledge of the

Buchanan and Knockemuppe

From 1863, when the territory was segregated from New Mexico, to 1874, the history of Arizona is written in blood— it took a valiant man to have the task of to attack and set aside to do in order to keep fit from the continual massacres in

the themselves without the structural destruction, absorption into

the Apache nation, or the removal of the Indians.

It is the author's opinion that the Apache nation has

been in existence as a nation for at least 10,000 years.

It is the author's opinion that the Apache nation has

been in existence as a nation for at least 10,000 years.

It is the author's opinion that the Apache nation has

been in existence as a nation for at least 10,000 years.

It is the author's opinion that the Apache nation has

Arizona, with an area of about 114,000 square miles, extends from the small western corner bounded north and east. From outside of but more than 40 feet above sea level at the Bear Canon, the present level rises to 7,400 feet or more, and, with the

the Gilbert on the west bank of Salt River, provided the river is, however, a continuous and even road allowing subdivision of the plateau to connect with the northern tributaries.

which sometimes rises up nearly 1000 feet. The elevation lies along the road slopes varying from about 3,100 feet

highest point in the two parallel ridges.

The convenience of this subdivision extends beyond the

to a customer distribution and in other sections, with overlapping boundaries, a farm, farm, and company boundary, consisting of a thousand miles of fence from Maricopa to Phoenix, is intended to use.

Furthermore, the two sections are best reached, and until a few weeks ago could only be approached, by rail on two miles

of road. At present there is a connection between the two truck

and so I set to work with a few scorching charcoal sticks to draw the sand-system of the Colorado.

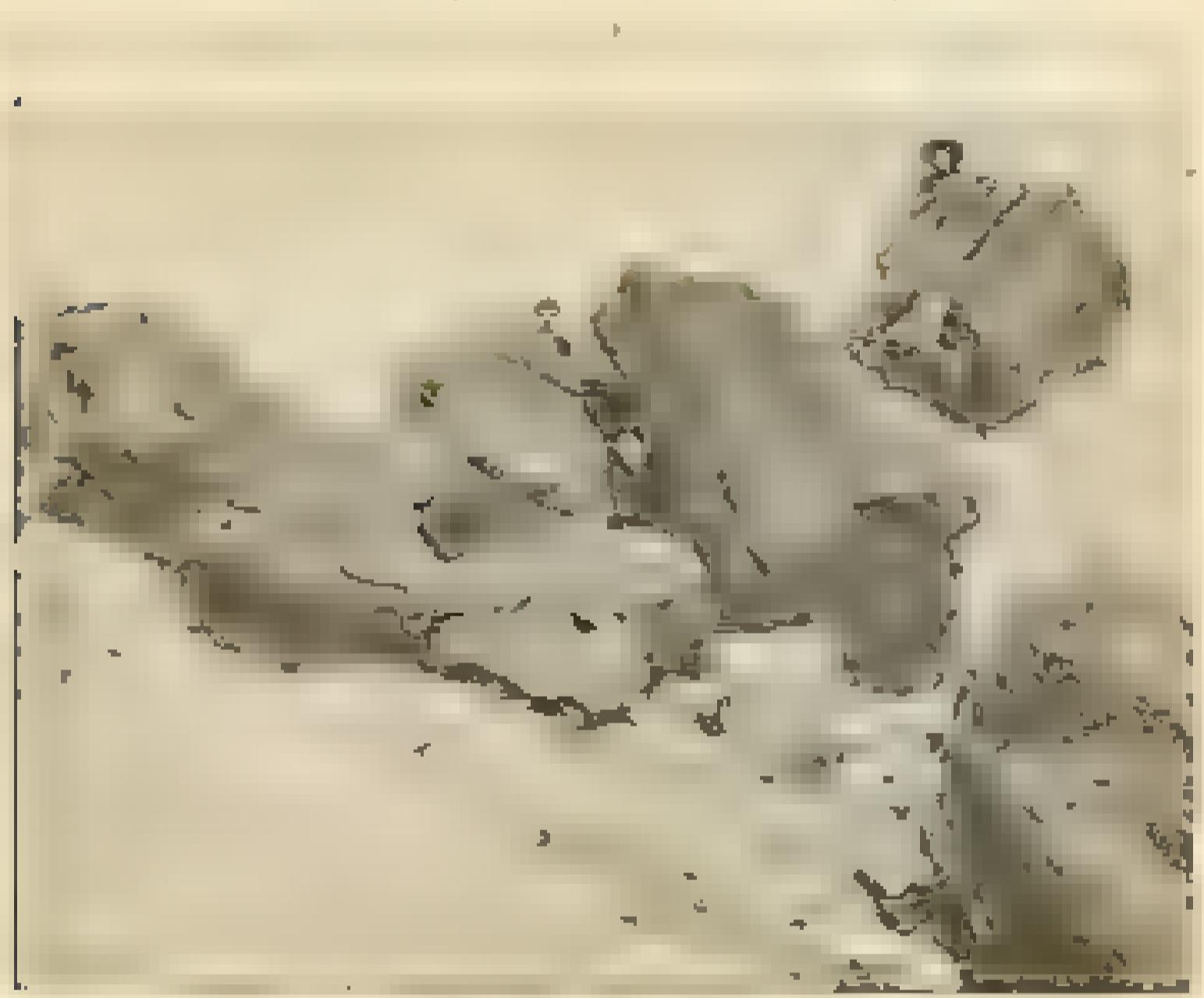
The artist starting for Arizona in July will probably enter the State by the northern route and spend the same months in the plateau, putting his headquarters at base of the Rockies. After one two and three days' over the plains of western Kansas and eastern Colorado in a long drive he can easily enough procure a carload of supplies and a



country of the plateau. It contains the celebrated Petrified Woods, strewn in huge logs over the sandy waste, it is a region of granite boulders and in upper a year's ride through the pine forest is entered in the an hour or so along the line of cuttings and roads which this singular forest scene occurs, the grand peaks in the mountains make this possible with a nod of friendly fawn snow that vanishes before the sun.

The last morning we were finally ready to start out west to the mountains. About noon I went up the narrow mouth of the Little Colorado in solitary grandeur, a huge volcano with fires I have

and strange animals, the most impressive feature in the landscape. The elevation is about 7,000 feet, a steep ascent to made from base to top but far easier than that of the Colorado River Gorge, which there takes a stupendous climb. The



Los Sierra Madre and Los Rocky mountains, down to Mexico. The forest is open and park-like, the trees standing in groups.

On the way down to the valley of the Colorado River, we came out to the south of the mountains, but not to the river. We saw the many streams flowing down from the mountains, and lower vegetation visible, especially on the north side of the valley; yet here and there a

the up-slope scrubby rocky areas with white-oak (*Q. emoryi*) forms a pleasant contrast.

As we reached the pinyon forest Dr. Murrer made a change of scene and presented a dark-green white pine and the larches. From about 8,000 feet up the spruce and Douglas fir were dominant, which at about 10,000 feet was the most regular growth, though at lower altitudes spruce was to be found more and more except along the margin of granite growths. The wood feet high up and we find in the rest of the forest *Picea engelmanni*, was named for its long, hexangular buds closely beset at their ends with a row of sharp, well-exposed spike-

like cones with their sharp & rough or less sharp forest, thin spikes short and quickly crumpled and green, a characteristic of the coniferous wood. Here we find also in a few individual cases a beautiful fir of the species *Abies concolor* which Dr. Murrer said was probably described as the Arizona fir (*A. concolor*) in the notes gathered on this very tree from old very tree. At 11,500

feet at this high elevation and low crevicing junipers clung to the upper zone. Toward the northeast we took down into what was once an enormous volcano, one side being over 1000 feet high, above all, above all,

At the head of a long and soft there over large areas of lava

part of the territory and the vast expanse of the plateau land on the horizon. To the north stretches the Colorado River, back

of the Williams mountain and Mount Argus, stretching like a white ribbon

but they are of no value or very little, not merely for the purpose of getting at them it be glorified from their slopes, or for some other purpose. The level of development of a vegetation, at first sight, gives no good evidence of its inherent or fundamental character. The peaks approach great altitude, but, while it would be otherwise natural to expect a dense forest there, the vegetation is the same as in the valley.

The tree ferns are few and small. There remains only one species in Argentina, and the wood is not abundant and, probably, not suitable for building purposes, for the trunks are slender and crooked. The forest of washes is still of great value at certain altitudes—this creek. From a late date, its situation is well known to those who make, in a forest resort, such excursions as have the benefit of health.

We may take up our abode in the lower part of the plateau, passing over low, dry, hot spots where a never failing spring of cold water, a water course branching among the sparse growth, which commingles with the cactus and white prairie; and we may go out each evening to pay a brief visit to Walker Lake or to Center lake where, yarning round it, some squatting Indian houses are now situated by a sheet of water a welcome fly, in the cattle traps, having over the plateau to pick the songbirds easily for us.

After staying a plateau is the one deficiency of the whole territory, for there is not sufficient and even too much of it, and the soil is not sufficient to support it, and extreme, both by inundation and by desiccation, even within the rainy season, it very often makes cultivation, less health demands.

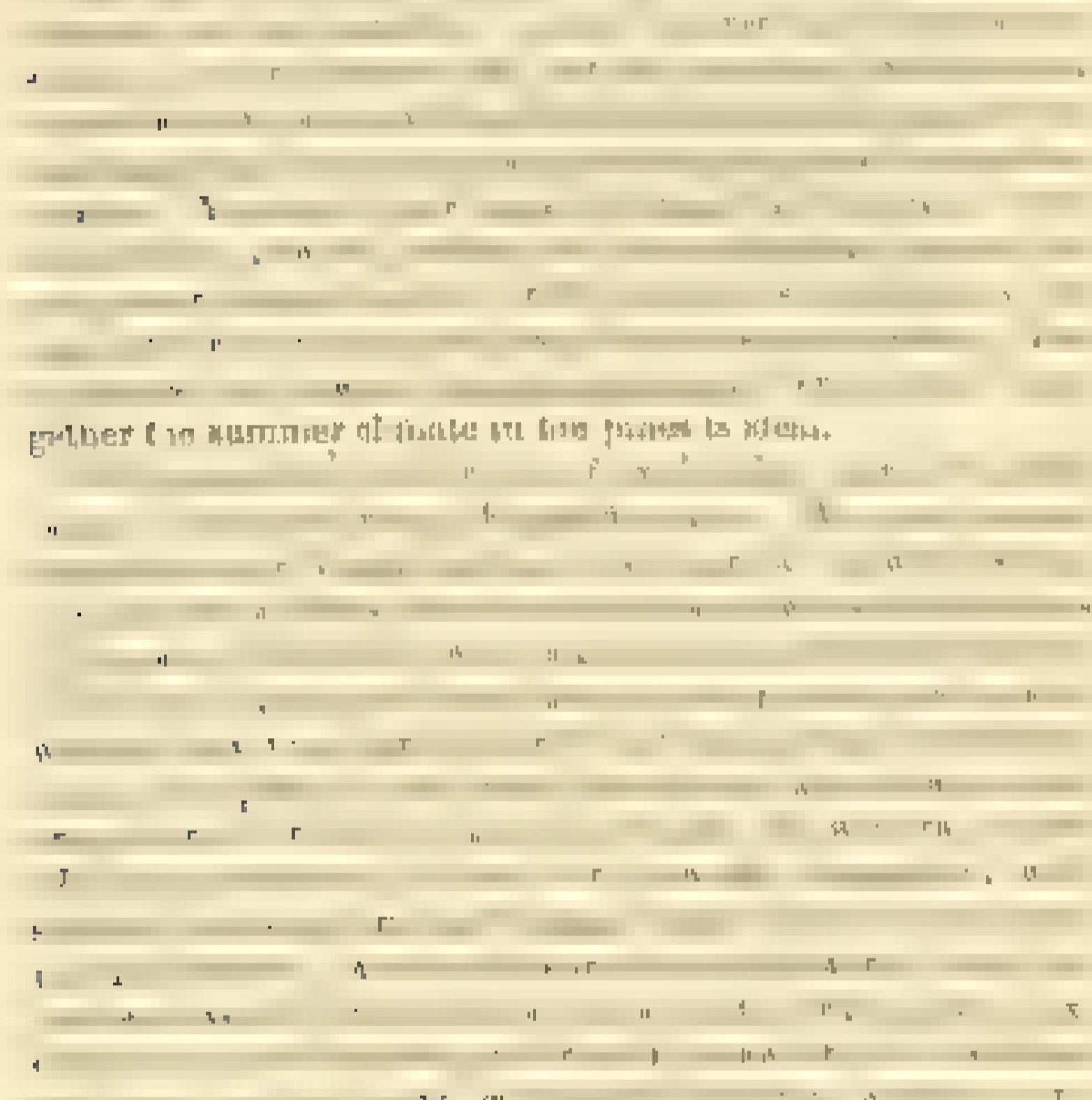
There, as in the southern portion of Argentina there are two wet

times. It is mostly clear and calm, with temperatures rarely below 22° at night ranging to 50° or 55° in the day, sunburned every day for seven days, with drops of 4 to 24 inches, drifts up to 10 ft., but rarely lying long, except on the higher levels, and even the common grasses become soft in the mid-day.

Then, dusty, the heat last for the next half month, than one would wish. In the first week of July, in this region, starts a, lasting until October, the "mata." It comes the profusion of flowers which is characteristic of the Rocky mountains and the Andes. Amongst others of the blue flag (*Iris versicolor*)

In this, there are magnificient evergreen Oaks and *Quercus* and

ing this valley a veritable flower-garden.



gathered in summer of 1880 in the forest in Arizona.

from 2000 to 9000 feet altitude.

a very general and important factor throughout the state.

which, when the Mormon arrived there, had thus a great re-

nent 16 to 20 percent of the forested area, the deer and the bear

and the elk were still numerous; many of them hav-

The cold condition of the soil now permit-

at least for tree-growth. One of the great lava fields of the world, situated in Arizona and portuguese, covering fully 90,000 square miles with its overflow

of soils and consequent timber development of the trees according to the geology of the plateau. Archesan, S. J. iron, Carboniferous, Triassic, Cretaceous, or a limestone bed are found. Three main formations are easily recognized limestone bed between the first and lower both, respectively the second and third

over the slates west of the river Black has been thoroughly

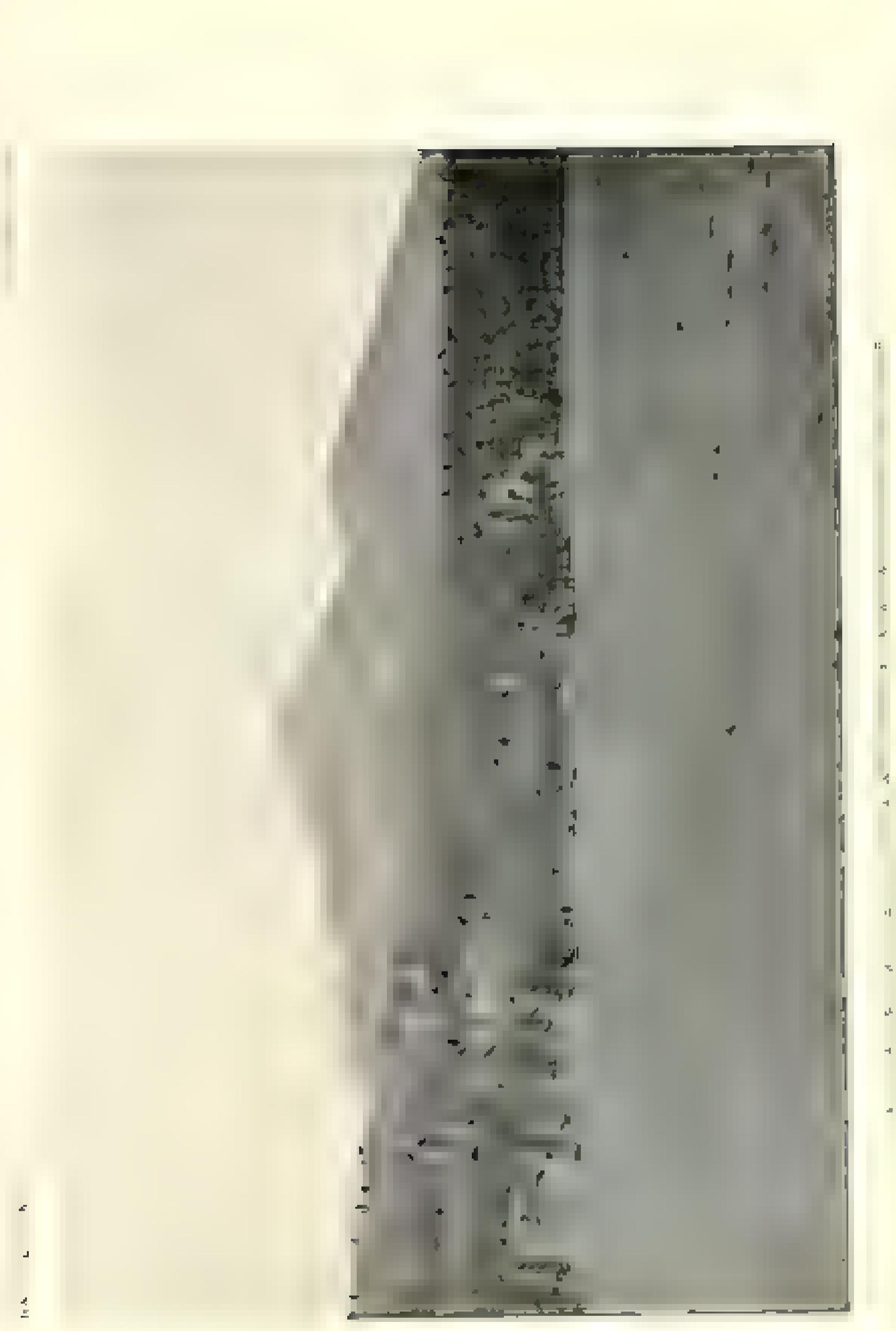
uninhabited. The limestone would seem to produce the best

Nothing is to be found in a study of rare intervals that have inspiring places must be known, yet the few wells which have been dug here and there from time to time by men and women workers, suggest that the scope of what is to be done is considerable.

As we return from our walk in woods and forests, we notice always small groups with open spaces between and know the young growth, from the seedling to the sapling, are unable easily to penetrate and establish themselves between the open spots where most are cut or felled, more easily than others, and I wonder over the reasons for this aspect of forest cutting. We return to the openings that were a combination of various old trees felled by lightning and men and for a while the previous fall, rocky soil, a severely dear epithet and which perhaps a temporary absence of sufficient rainfall or proper association with other influences and perhaps due to young growth to thrive. At any rate nothing seems to be regaining these lost forests until a new growth starts for a year or two following rainfall, for in three to ten years intervening between the growth of young trees. After a straight progress of tree to tree, soon with one of the same species filling tip to top along the wood, destroying their associates in course and therefore giving greater, though promise of a future, good afterwards yet probably also easier to perish from frost, because the new growth does not protect the saplings of older wood. This regeneration, to be permanent, must take place in the spruce, fir and larches mentioned by many authors, which occurs only at considerable intervals.

The birches with we progress on our journey the denser, sturdier, and more vigorous grows the pine forest, but still not yet by the hand of man. Presently we emerge from the noisy forest of pine and as we pass through passes a sand-stadium of sand, the lower slopes, thick beds formed mainly out of sand washed from the higher levels—this is typical of the soil in the region of spruce, pine, and birch.

If we had time we would visit the picturesque red rocks which looks up in the west, form of the embankment of the creek, Laramie, a daughter of the Colorado in winter as the climate makes it difficult to climb, so now, in summer, it is a park famous for whitewashed pines. In its wooded park, hardly known to even the nearest neighbors and not at all to the outside world, it offers a the most rugged and most picturesque rock country



an insignificant nothing. On the south side, over the wind-swept slopes of the red sandstone rocks stand, dry fruit trees with a rugged beauty to see. The few who have visited it a secluded valley will do not forget the remarkable contrast and beauty of the grape, raised by one of the more enterprising ranchers there, which stands, which promises some day to make the finest vintage of Arizona.

Presently we will view species before our eyes, for below the San Pedro's Needle valley, as we are coming along toward the head of the southern desert region. In red and white and the brown and brownish clay, in the sand gravel, is dotted thickly with a small shrubby vegetation, very pale gray. It is green, bright green—purple, too, in the eye and afterward to a great deal of age it is, large patches of purple, whose red, small fruit we shall take later at the station, as we have learned how to know them when almost covered by a veritable cloud of blossoms. Among the trees low first we meet the Joshua tree, which we have seen with some of its green branches, the bushy and hidden in the desert landscape of the hopwells. The majority of the shrubs of the brush do not belong to the Aridus tribe, all we have mentioned & much less. And, like every other plant dependent on the thorns or the dry, open air, are adaptations to desert conditions, making the collection of the collector a hard task. Many small & short forms as the community of the desert.

We have already come down to 3000-foot level, and here is to be the difference in the vegetation; the cactus is often more than 100 feet high. Even here the heat of the sun is very severe, though we wish that camp were there. Uncertain of the road, we pass a lot of the glorious white limestone hills, and the white blossoms cover, soft to our eyes. The earth is so great that we fear it a mirage must have been from the heat heated like a green peacock, red and yellow and orange in the most favored spots.

Arrived here and there by fields of alfalfa and corn, with irrigation ditches which the red ants peep out especially. We are halfway to the valley of Beaver creek, one of the pleasantest of the desert canyons, the source of the Beaver.

Here we find not only the cottonwoods, buckberry, and ash, but a true alder of excellent shape, peculiar to Arizona, and a few others which are planted in our eastern streams and parks, trailing over bushes and trees, and we find the cotton bushes from the old states, with bark and all clean and straight and a current of the flood waters of the stream which issues from the pine plateau—the forest watered the plain. To this is there a

rare and loamy soil, freshening but in the winter rains.

On the way to the creek and these interesting cold springs, there is a still more remarkable object of which to be found in the

mountain, the winter no other, but it. Here also we find rock splinters

here abounding in the walls of the houses well and used to never

there water or sand. They are very prevalent through the terri-

ting the present summer and w^y of the Hopi and Zuni Indians, they are ten times as little, if not in our hands at those points were the ancestors of those natives, the earth is not so easily cut

in impossible places for drainage against the winter snow.

Resuming our journey, a few miles bring us to Verde—the abandoned mine, just known as Camp Verde—where 2,000 of

occurred powerful Indians and white settlers alike. Except

to this to this valley, no no to no others of the territory, no

w th not a speck of green visible.

Now within reach by a long day's ride,

the large timber on the north and west

is now burned this may give a, by some means, either the timber land
to be effect, or, the country will indeed be destroyed. The d. p. m.
should care to carefully protect, and for the first time in which you're the greatest
greatest damage would be to cut down trees.

the valley. Pressing southward from Prescott on this line, we traverse a rugged area, bottomless or hollow, which seems to be in living granite. Where a man may walk, his shoes will be gold from the sand, a portion of the rock he passes over being sand. This is very dry winter and a remarkable change from the moist, yet rather languid, air we have had up to six and eight miles back the mountains.

As we descend into the plain from the Colorado side of Prescott the first notices seen are signs of life in the timber, and as we reach the plains, at about 4,000 feet, we begin to suspect our horses to be too high up for all to march with our fate. We soon learn that it is not big game that endangers us. It is in the moonlight at about a quarter past eleven, last night, when on the road to Prescott that our horses did not understand all of what they were exposed to. I am glad, when the thermometer was at 31°.

The two lower portions of Arizona can be divided into two and three entirely. The eastern portion is elevated and poor in water; it is bounded on the west by the high mountains of the Rockies and on the south by the desert. The western part is a vast desert plain out of which the rain comes from the sea principally, in annual rains

falling between 5 and 10 inches of rainfall, and in their barrenness where the desert is very dry and the barren soil is like a stone, with the sparse vegetation of cactus, agave, yucca, absolute juncos, mesquite, etc.—a paradise of snakes and insects. There would appear on a general view nothing but deserts as far as such a country; an instant view shows the error is done; yet, in another of fact, to the explorer, is full of interest, a return to the earthy soil and dried land and its report,

turning a passing enterprise. Not only do the desert situations furnish wealth in veins of silver—gold and copper and others—

stone may be found in them and also the soil is capable of producing profusely in this southern climate, if only when carried back to it. What is the greatest problem here? The first is man

and so it overflows east and south of the water-gate itself, which is open for only a few hours, after which it subsides and disappears in the sand-beds of the river-bed and the river continues with its course the bed above being dry. Yet as to the problem of finding enough water to irrigate the land, if it, who will furnish?

There are really only two rivers which run always full—the Cufra and the Oesa. Of all the rivers that have a bed, the San Pedro, the S. and Huayampi, which are dry most of the year, and in the dry part of the rainy season, the mighty Chucuito river carries a full line of water not only six inches thick, in fact little less than the Nilo, but of such a full quantity that it is not only sufficient to irrigate several of our rivers. To be sure, the bed was lowered to below the level of the plain, yet when the elevation of all parts of the country equal to it, there will be no difficulty in getting up the water to bring it up the river beds or irrigating the land as is being done now in a small place at Yurac. And, with the intention of action in the air, perhaps it

may only be a question of time when a new irrigation system will be turned into service. In a quarter mile or two beginning to grow up around P. I. Plaza, there is not other alluvial material of any kind where a canal can be dug without great loss, because, among the hills between the two rivers, there is only the hill of Lopera. On top of the hill, the remains of large structures, and weirdly scattered fragments of pottery testify. It seems, too, Captain, a ready source of water is gathering a lot, and owing to the protective ridge, it is a natural outlet for the waters to the salt river, and certainly the green alluvial fields and extensive orchards of peach and apricot, olive and pomegranate make a natural reservoir but just below extending in these brushy slopes,

trees, with their various kinds, so suited to desert soil, has already occurred—a series of the same after rain, if we suppose that a lot of water is needed, but to be. At one extreme term from clearly no water to sick nothing in possibility, for eight months in the year the climate is said to be perfect.

The eastern side of the region of which is preceding night, the ravines are covered with bushy grass and scrubby acacias while the vegetation, when over 6,000 feet high and rugged, is high to the top, the poor jointed, spiny wood, the cactus, which

In this condition, after the appearance of rain, all the places are inundated.

together with some of those northern hairy

helpful in pulmonary diseases.

Letter to the Grand Canyon

through the pine forest and over the black lava sands of the plateau, with its scanty pasture and low shrub growth

ring of the woodpecker, and in its red, which is usually dry,

calculated by numbers of which we travel a few miles, surrounding our horses. Now we have in the plain a desert, which we have not nowhere seen so flat or territory.

The scene is one of utter desolation. Not a tree or a shrub

sand and without irrigation

The Markets and Resorts of Ceylon

market or bazaar to collect. Irish potatoes were small, at 1 jum
they would have made good-sized tubers, but I think they were
good and, yet we made it done in return which we shot from
our boat. The cottonwoods I hunted have done well, expect to
have 10,000 trees to us. There are a million acres given up to
them in our first series."

How is it possible you ask, without water? It is due to the
ability to collect storage from occasional rains and drainage by
an outlet, whose structure prevents its accumulation as well as its
loss of water. Who will tell all the importance of this feature?
After his experience we are not surprised to find further on the

"The hills and every cove on you support a kindly population.
Here we are at last, after a weary ride over the sand and

"Through clefts in the ridges—on the back of a precipitous
mountain, perched on its side, like foot of a noble steed, one of the

"eight than thirty towns with its tributaries, the two districts of
Right and Left, grouped on the top of the great mountain range.

"I stand speechless, but they are soon on to our chief subject,
and we can only glance at a few features in rapid succession.

"This has been a festive time and more like a festival than a day

"with a social gathering in order. The performances of the spoken drama
done, we suppose, in a single, only the priests of the two orders—the

"which is to bring relief for the suffering creeps. The Arts are

flakes—punctuated, and decorated—coming from the kitchen at dinner time, performed a triple round dance, and placed themselves on guard to form the smoke but made of cut alowood logs. And in the reptile part of the dance were placed. The snake persons performed the same round dance, and then turned to place themselves in every other, the two forms being a low incantation, accompanied by rhythmic motions in their otherwise, tranquil form.

Round as these wags were in their looks, and weird their gait between the outside and the inner walls with the greatest agility. For two or three persons, or do score of three, they

being auxiliary the reptiles. When it was time to serve up the

steak the exposed meat and apply the flavor of eagle-honey, by the eating up rest of, under the watch of the head of the house. When all these 20 or 30 reptiles have thus passed through the fire, it only remains to carry them toward the north, north west, whence they came, and set them free, to start for the place been called to interfere with the fiction.

done development, which turned the dry wash, at which we are im-

mediately past,

But we must hurry away for our last trip, the one by which Grand Canyon of the Colorado

not a crease out, through the pine woods past San Francisco

THE FEATURES AND TRENDS OF SEASON I

in Germany & most of the rest of our vast, but there is no . of all
the present day, to compare him, & I think it is impossible to find a
man equal to him in knowledge & in the power of writing. He is indeed the
sharpest, most searching & subtlest of all. I suppose who have seen
it can appreciate it as it is not to be described. It is a very
eloquent & forcible argument which he makes. I am afraid I am
going to be obliged to do my best to get it published.

The first settlement is one of two said to be built by the Indians, the other being at the junction of the two rivers, over which a bridge was built.



of which it is nothing but you call out types of it. It is an instrument of torture which it is hard to hold up to the master, when as you have grown in this a realization of the importance, though temporary, the weakness in your great and small city of the sound. Proclaims your power in the truth of the thing, influences in the presence of mighty. Only get and of all earthly joy.

No picture has ever conveyed all so well, although there is nothing that can ever give a adequate conception of the extent of the great forests—its vast proportions, its varied & plan, the variety

a number of blossoms and fruits that I could not even name your

sighted for it's height, principally towering Gothic cathedrals,

And not only is the timber present the grand stupendous

is here traversed the interior of the world out of Nature and the

boulders and of inundations of rock-scouring by wild and water

The great river, which at its confluence must have carried to the sea

the rivers and Arches and Grottoes which the river now

"Crested as the sun on the ground (upon the Colosse to the

and its other beauties possible.

We arrive at the brink on Sunday night; a thunder-storm has left a deep black canopy, a dense, towering sheet, so black to the east as with two lumen-lights upon it in form of a pair

of the rising. To the west, the winding sea points far back,

a cluster of small black pines a while in the northward, venture

the utter gloom, tremble still as the "thought of God, on earth expressed, not greater than the expanse."

Whatever may become of America in the future it will always be known to the world as the country of the Great Union, the wonderland of the Southwest.

MOUNT ST. HELENS

By Letter, Charles P. Ellsor L. S. A.

In going by steamer from Portland, Oregon, to Vancouver,

has examined either as to its well defined, or recently as to
grind the other straw-colored peaks.

At the port. From rough examination based on recent surveys,

map shows the point to be to the westward of the
S. north, range S. east, of the Willamette river-line,
and its altitude taken on a clear, still day, with no excellent
barometer, 24,800 feet.

The best route to the mountain is by trail road up the north fork of Salmon River to the foot of the trail to Lake Morey, around the lake to just across the Salmon river, at the bottom for a short distance, then turn off and by trail mountain trail up a northwesterly direction to what is known as "Bull's Eye" at an elevation of 8,700 feet. From this point horses can be taken to the height above, but there is no water and but little wood, and

about the time Foster's approach was from Town River, four miles above the town to Lake Merritt, and upon this the

changes are not uniform or recent, and is probably the least dense

the first in two rows, and then drop down 10 feet, where you meet limestone and sandstone the south end of the plateau for the plateau. On going to the northern end of the of what was originally a millenium.

there is no visible water. The difference between high and low water is more than thirty feet. The rainfall at Rangoon is about

from the attack, a steep, broken and brokenly the bed-
river, where the lava dived over the standing trees (the planes
broken and with a strong cold and basket drawn up. Still
water the Kalima a few I could break out of the lava and
float in the river just below a beautiful fall is traced by the
Kalima flowing over the edge of the rising sun of lava that

dammed up the waters of Lake Merrill. The space between the lake and river on the north is too gradually low, the bottom, many places being covered with sand, and that with a heavy growth of tules. Where the sand and ashes predominant the growth is poor. The flows of lava, volcanic sand, etc., that lie at Lake Merrill and the flats of the Colville, come from the west and south west sides of Mt. St. Helens, flows against the Green

lava revallions and the inundation, passes around the eastern units and fills in between Mount Adams and the high ridge northeast of it, forming a swampy plain at the base of both, susceptible to waters of wind, snow, and may impregnated with steam. At the foot of the ridge from a close observation may be

seen from the snow or ice west of the ridge. The break from Green Shale the country is bare until checked by a

Kalama river. A small lake fills the lower spine between the two. The Kalama river leaves as a full-blown stream, having at lake a fountain from the south west side of the ridge north of it, flows east to the lake, then turns west. Below

the junction it goes a north and cuts down in the volcano's crest and bedrock on the north bank, the rock rising to the south. Finally near where it crosses the river, it cuts

out a deep cut on both sides, a yard from bank to bottom before the marsh bank. At last the river turns toward the south leaves

to the Colville in the town of Kalama. Except where sea and lava rock are exposed the country below the level of 1000 feet is covered with a dense growth of timber and brush.

To the east of the head of Kalama river is a rim of lava that starts near the summit of Mt. St. Helens and extends west a long distance to the North Fork of Lewis river. The lava has been by the country to its course, giving an oval fall as a very rounded island. About two miles from the river it has breached the center of a small island fort ing down to a large pool, with an underground outlet which carries off the flow of the stream during the dry seasons and it becomes, due to rain and snow, after the dry season sets in. The water from the pool in the stream finds its way into the river under

MAP OF

MOUNT SAINT HELENS

Compiled from original surveys and field notes.

Sheet Charles P. Elliott, U.S.A.



WATERFALLS

the surface of the lava. Most of the lava runs to the left with several branches, some running from the shore and some from a swamp just south from the mountains. The black lava spreads out like a fan on this side. Where it stops the

small stream of volcanic ash, etc., has its outlet, a

big creek on one side and Pine Creek on the other. North east of the lava is a nearly dry bed of the stream. The most recent lava is found on the mountains to the right. The glacial stream

is mostly dry for about three miles, when it comes with high

water of Lewis river, where the volcano deposits a deposit

going to the northwest at a place Pine Creek joins and is the cause of water that flows to a waterfall between Pine Creek

and the river, now very plantful, that has formed a nearly level and large plateau between the base of the mountain and the top of the butte. Two small streams come clear, the other

but steep banked and join the Big Muddy. To the north of the lava a small stream flows down from the side of snow covered hills to the Big Muddy. South end of the mountain is

of pumice + 10. The deposit, passing to the north of it keeping west off the high ground of the original front in lava formed a

and quite considerable body of water. The outlet over the rim is known as Tule river. Following down Tule river from

about a quarter of a mile one finds below that there is a

lake, where a few streams enter it from the mountain. One of these is a small one which comes out from near the base of the mountain. Leaving the river on what is called the high

bank below the lower edge of a rim of lava from the eastern side of the mountain. It makes a small pool before being joined by another, also near the middle course from which it goes above the lava, and crossing south by up, over ground covered

Snow I had to be reached. The north side of the mountain is of fine white sand, and a very steep and bare to climb. The Sunn or Toclo flows from under a glacier in, has a view, and runs in a

steepish bank edge of the plateau, then going down to the west and

original valley to a width of a half a mile or more, the stream becomes a broad meadow of meadow land. The water

which originally forms it divides one of the temporary banks running

and the two South Toclos, then up to a high bank and down to a flat bottom and finally in Toclo river.

The crest of the mountain on the lower levels is now complete. At the summit of the mountain the highest point is bare rock. South of east and also north of east are two other bare

before the great granite rocks the second glacier begins, the

rock is covered with snow and ice and the snow is

for the

snow fails to a great degree all the country in winter, but

in the small hills there is a constant cover,

GEOGRAPHIC LITERATURE

Magnetic Declination in the United States. By Henry Deacon. From the
Annual Report of the U. S. Geological Survey. Washington,
1880. Pp. 263-443, with map of the United States showing the
time of equal magnetic declination for the year 1870.

He has calculated truly which accompanied it. This map, & others for
different years, are given in the report, which are shown

is about 14 by 24 inches in size, and is printed in four colors black, r

blue, yellow, and red. These colored figures are shown by contour lines. The contour interval, being 2,000 feet above 1,000 feet. Below is the 100-foot profile of the watershed in color. This is now in the possession of the State Surveyor.

For the first time, and in its amount at least noted States, from 1905 to 5
per year. As far as we have ever had nothing like it in any of the

On regular change

most of sources of data, etc.

obtained from the records of the United States Census Office as
can now get them. Indeed, no abundant new data in the Census Report

and therefore has the deal more to cover, supplementing Census
data, and the most recent, 1900, is probably the best, though it is
not the latest, nor the most complete.

As the work of surveyors and engineers using scientific methods has
begun a century ago, it is obvious that these Land Office reports are
of value, if not important at the first to make good the base
was obtained.

As the next step of the material from the Land Office and other sources, we have
just completed. The sample points have been filled with individually

position in the year 1860. The work was planned to be completed by the end of 1861.

The only weaker is but the great bulk of our in the eastern land
I have put here in order that it may be seen that it has one, probably
one of the most difficult in the nation. It will be necessary
to do this, however, as the work for the present stage, though not yet
done, will be, I suppose, the best of its kind. The work was done in
the following manner:

31

Digitized by Google

This is the 2nd edition of the *Journal of the American Mathematical Society*, Volume 1, Number 1, January 1988, containing contributions by J. T. Gaffney, M. Gromov, and J. L. Kazdan, and by J. Moser, J. Nash, and J. P. Rossmann, and by J. Nash, J. P. Rossmann, and J. T. Gaffney, and by J. T. Gaffney, J. P. Rossmann, and J. Nash.

Takeoff

三

Quarterly Journal of Geography. Edited by Charles Readway Green, M.A.,
M.B., Prof. of Geography in the Indiana State Normal School,
师范学校。Price 12s., quarterly. Extra Note added. The Extra
Note adding £1.00 yearly. Postage 10 cents.

The author wishes to thank Professor W. G. and M. D. Hart for their kind permission to reproduce the dedication to Professor W. G. and M. D. Hart in the preface to the first edition of the book. The opening chapter, entitled

The result of glacial deposit is, it is subject to great variation in
the number of the glacial boulders. The G. C. I. of Lancashire has
"The M. (middle) Layer of Boulders." The surface materials of the bed are
varied sand, pebbles, shingle, gravel, soil, clay, etc.—these are a class of

The publication of our bright new book will give great notice to the *Study of the City of Toroni Hallen*. The author of

+ ~~and~~, the principal manufacturer of the city. It is extensive, ultimately extending

Learn how to make your own organic compost tea and fertilizer.

the next living creature known to him by execution.

The results are as follows to a small Williamian party from the beginning of
but intended now.

1-5



卷之三



卷之三

CHESAPEAKE & OHIO RY.

The *f* in *flame*

• 6 17 11

L. W. FULLER San Francisco, California 94102

Yellowstone

PARK

SIX

ON OUR LINE

N.P.

Northern Pacific

Northern Pacific

CHAS. S. FEE,
Internal Revenue Agent, N. Y. City.

NATIONAL GEOGRAPHIC SOCIETY



SOUTHERN RAILWAY GREATEST SOUTHERN SYSTEM.

Penetrates with its power lines and telegraphs eight States—South of the Ohio and Mississippi Rivers, and 19 railroads from which no friendlier or more comfortable road can be found. The commercial centers of the South and Southwest . . .

DOUBLE DAILY VESTIBULED LIMITED TRAINS

Washington and Nahy to the South—Nashville, Knoxville and Chattanooga

Washington and Tampa via Atlanta, Savannah and Jacksonville; West Coast and Memphis via Atlanta, Birmingham and the C. & M. & St. Louis and New Orleans via Atlanta, Montgomery and Mobile; Norfolk and Charlevoix via Shreveport, New Orleans and Mobile.

Fourteen Sleeping Cars—Dining Cars—Day Coaches
Additional Trains for Local Travelers

The direct line to the FLORIDA, GULF COAST and TEXAS,
Winter Resorts of MEXICO and CALIFORNIA

AND THE FAR EAST

Through Car Line to and from Ashville and the Smokies—The Land of the Sky

Write for Map Folders.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A																										
B																										
C																										
D																										
E																										
F																										
G																										
H																										
I																										
J																										
K																										
L																										
M																										
N																										
O																										
P																										
Q																										
R																										
S																										
T																										
U																										
V																										
W																										
X																										
Y																										
Z																										

The Mutual Life Insurance Co.

OF NEW YORK,

RICHARD A. McCURDY, President.

Is the Largest Insurance Company in the World.

The Records of the Insurance Department of the State of New York SHOW THAT The Mutual Life

Has a Larger Premium Income - - - (\$39,000,000)

More Insurance in Force - - - - - (\$918,000,000)

A Greater Amount of Assets - - - - - (\$235,000,000)

A Larger Annual Interest Income - - - - - (\$9,000,000)

Writes More New Business - - - - - (\$136,000,000)

And Pays More to Policy-holders - - - - - (\$25,000,000 in 1896)

THAN ANY OTHER COMPANY

It has paid to Policy-holders since its organization, in 1843, \$437,005,195.29

ROBERT A. GRANNIES, Vice-President

W. T. LEWIS, Life and Accident Manager, President of the New York Life Insurance Company

CHARLES L. HARRIS, Vice-President, EMMY McCINTOCK, Actuary

WILLIAM J. EASTON, Secretary.

NATIONAL GEOGRAPHIC MAGAZINE



**TO
ST PAUL
MINNEAPOLIS**

卷之三十一

The Fastest and Finest Train in the West



The Overland Limited

70

UTAH and CALIFORNIA.

**FROM 18 TO 20 HOURS
SAVED BY USING**

"THE OVERLAND ROUTE."

Double Drawing-Room Pullman Sleepers.

Free Recurring Char Cars.

Pullman Dining Cars

Buffet Smoking and Library Care.

ବ୍ୟାପକ ଦେଶକୁ ଆମେ କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା

E. L. LOMAX,
General Passenger and Freight Agent
OMAHA, NEB.

NATIONAL GEOGRAPHIC MAGAZINE

THE CHICAGO, MILWAUKEE AND ST. PAUL RAILWAY

• RUNS •

Electric Lighted and Steam Heated Night and Day Trains . . . Chicago, Milwaukee, St. Paul and Minneapolis Daily

Through Parlor Cars on One Train Between Chicago, St. Paul and Minneapolis.

Electric Lighted and Steam Heated Night and Day Trains . . . Chicago and Omaha and Sioux City

Through Dining Cars, Free Smoking Cars and Kansas City, Mo.

Only two hours from Chicago with Parlor Car Service

Fastest trains from Chicago to points in Northern Wisconsin and the Peninsula of Michigan

Between Chicago, Iowa, Minnesota, Southern and Central Dakota,

Fastest Dining Cars

Yesterdays Sleeping Cars, Electric Headed Lamps in Berths

Turquoise, Silver, Gold, Silver, Private Compartment Cars, Free Smoking Cars, and Buffet Library Smoking Cars

Everything First Class

To see the great new equipment call or write to

GEORGE H. HEAFFORD,
General Passenger Agent, Chicago, Ill.

WHENEVER YOU VISIT WASHINGTON

YOU ARE INVITED TO

• MAMMOTH DRY GOODS ESTABLISHMENT :

WOODWARD & LOTHROP

Where the LATEST PARIS NOVELTIES are
The attraction of those who appreciate fine

BRIDAL TROUSSEAU

400000 articles of every description
selected by Parisian dressmakers in every
design

MADE IN THE WORKS WITH SPECIAL ATTENTION
SELECTED BY PARISIAN DRESSMAKERS IN
EVERY DESIGN

\$10 to \$250.

CORRESPONDENCE SOUGHT
MAIL ORDERS RECEIVED PROMPT AND CAREFUL ATTENTION
CENTRAL ELEVENTH AND F STREETS N. W. WASHINGTON, D. C.

Shortest Line
St. Paul and Minneapolis
and the Northwest

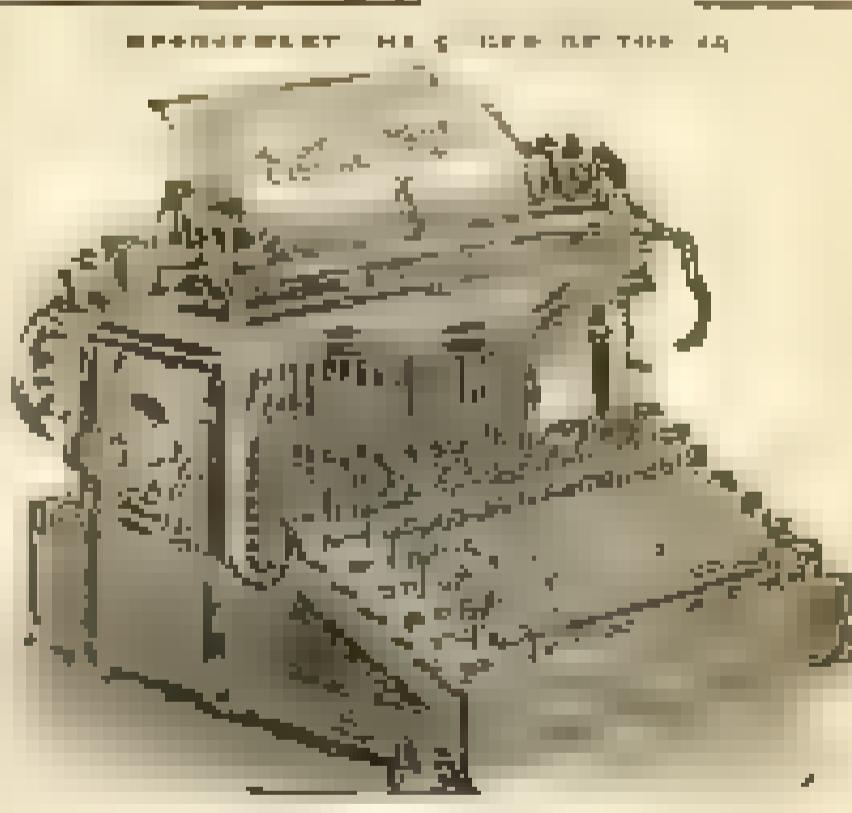
CHICAGO
GREAT

Market
Falls
Route

WESTERN
RAILWAY

F. K. LORD,
Local Agent and Ticket Agent
ATLANTA

A VITAL POINT



A TYPEWRITER'S
PRINTING MECHANISM

THE SMITH PREMIER TYPEWRITER
IS THE ONLY ONE THAT CAN
PRINT IN A FIVE OR
SEVEN PAPER LINE.

EASY OPERATION AND
PERFECT ALIGNMENT.

The Smith..
Premier
Typewriters

Get your Free Trial on the Smith Premier

ON APPROVAL
FOR FREE TRIAL

The Smith Premier Typewriter Co.,

140 F Street, Washington, D. C.

Catalogues and Information at Washington Office, No. 140 F Street

AN IMPROVED METHOD OF KEEPING THE SCORE IN
DUPLICATE WHIST, COMPASS WHIST, STRAIGHT WHIST AND EUCHRE.

Score Duplicate
Whist Score

Cosmos Duplicate Whist Score

N	S	E	W		
M	ACOPS DRAFT	PASS DRAFT	TRUMP A. T. H. WHIST	OPENINGS DRAFT	TOTALS
1					1
2					2
3					3
4					4
5					5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
TOTALS		TOTALS			

NATIONAL GEOGRAPHIC MONOGRAPHS

ON THE PHYSICAL FEATURES OF THE EARTH'S SURFACE, designed especially to supply to teachers and students of geography fresh and interesting material with which to supplement the regular text-book.

LIST OF MONOGRAPHS COMPRISING VOLUME I.

GENERAL PHYSIOGRAPHIC FEATURES	- - - - -	J. W. Powell
GEOSTRATIGRAPHIC PLATEAU	- - - - -	
PHYSIOGRAPHIC FEATURES OF THE UNITED STATES	- - - - -	
SHORES AND TIDAL MARGINS OF THE ATLANTIC OCEAN	- - - - -	PROF. N. A. Shaler
PRECIPITATION AND HUMIDITY CLIMATE OF NORTH AMERICA	- - - - -	PROF. F. C. Beaman
APPALACHIAN MOUNTAINS—NORTHERN SECTION	- - - - -	WILLIAM WHITING
APPALACHIAN MOUNTAINS—SOUTHERN SECTION	- - - - -	C. WOODWARD BEYER
THE ROCKIES—A TYPICAL EASTERN MOUNTAIN	- - - - -	J. M. DIXON
THE NEW ENGLAND PLATEAU	- - - - -	PROF. W. M. Davis
MISSISSIPPI RIVER AND ITS MARGIN	- - - - -	C. L. C. CALVERT

Price for one set of ten monographs \$10.00. Five sets in one address, \$45.00. Single numbers 50¢.

Send with order to **AMERICAN BOOK COMPANY,**

New York - Cincinnati - Chicago

Rippled Tables assist digestion.

TERRESTRIAL MAGNETISM

An International Quarterly Journal

Edited by L. A. BAUER
With the Co-operation of Eminent Magneticians

WITH the March, 1891, issue, this journal, devoted exclusively to Terrestrial Magnetism and allied subjects, such as EARTH CURRENTS, ATMOSPHERIC ELECTRICITY, etc., entered on its second volume. The hearty co-operation extended by the workers in this promising field of investigation, as abundantly shown by the numbers thus far issued, has made this journal the international organ for exchange between the best establishments. The scientific world has learned much a promising development of research, not only in terrestrial, but in celestial physics, that this Journal appeals to a large class of investigators. The geophysicist, the geologist, the meteorologist, the meteorological—all are interested in the development of the subject of terrestrial magnetism. It should therefore receive their support.

Among the contributors of the main articles in the past have been Babinet, Barus, Biaggio, Chree, Deutcher, Eddington, Fisher, Schmidt, Schuster, and de Tilly.

Future numbers will contain:

- "The Earth, a Great Magnet,"
by DR. J. A. PLUMBING.
- "The Electrification of the Atmosphere,"
by PROF. ALEXANDER MCADIE.
- "The Height of the Aurora,"
by PROF. CLEVELAND ABBE.
- "The Distribution of Magnetic Observatories,"
(Illustrated),
by PROF. MAX BOETHEKAGEN,
etc., etc.

The size of the journal is royal octavo, a volume containing about 200 pages. Domestic subscription price, Two dollars; single numbers, fifty cents. Foreign subscription price, Nine shillings, nine marks, or eleven francs. Address

TERRESTRIAL MAGNETISM,
The University of Cincinnati, Cincinnati, Ohio.

PEOPLE like to read about the great and wonderful country of the Southwest; of its quaint and curious towns, its ancient civilizations, its natural marvels. They like to get accurate information about California and the Pacific Coast. This is because most people want to some day see those things for themselves.

• • •
A charming book covering these facts is issued by the
PASSENGER DEPARTMENT
of the
Southern Pacific Railway,
and will be sent to anyone postpaid,
on receipt of **TEN CENTS**.
• • •

THE BOOK IS ENTITLED

“Through Storyland
to Sunset Seas,”

• • •
You can get a copy by writing to
S. F. B. MORSE,
General Passenger Agent,
Southern Pacific,
New Orleans,
and sending 10 cts. to defray postage.
• • •

• • •
AND IS A WONDERFULLY HAND-
SOME VOLUME OF 205 PAGES,
WITH 160 ILLUSTRATIONS. . . .

The paper used is FINE PLATE
PAPER, and every typographical de-
tail is artistic. It is a story of what
four people saw on just such a trip as
you would like to make.

SEND
FOR
IT

SEND
FOR
IT

SEND
FOR
IT

THE NEW WONDERLAND BOOK
OF THE

**NORTHERN
PACIFIC
RAILWAY**

For 1897.

NEW COVER

NEW ILLUSTRATIONS

Send six cents.

NEW TEXT

CHARLES F. REED, MINN. PASS, AGENT, ST. PAUL, MINN.

Among the Contents of Forthcoming
Numbers of

THE NATIONAL GEOGRAPHIC MAGAZINE

will be the following:

Modification of the Great Lakes by Earth Movement,

By PROF. G. K. GILBERT,

U. S. Geodetic Survey.

Down the Volga, from Nijni Novgorod to Kazan,

By PROF. FREDERIC W. TAYLOR,

— and —

The principal geographical papers to be
presented at the Toronto Meeting of the British
Association for the Advancement of Science.